

CATHODOLUMINESCENCE STUDY OF FRAGMENTS OF THE MARTIAN METEORITE ALH 84001. Walter J. Protheroe Jr.¹ and John Stirling², ¹E-MAC, Inc., 8711 Beau Monde, Houston, Texas 77099-1107 (corvos@aol.com), ²Geological Survey of Canada, 601 Booth Street, Rm 761, Ottawa, Canada K1A 0E8 (jstrilin@emr.ca).

The purpose of the study was to determine whether samples of the meteorite ALH 84001 would display any cathodoluminescence when exposed to the electron beam of Camebax electron microprobe. Dr. David McKay, NASA, selected eighteen small fragments of the Allan Hills Martian Meteorite (ALH 84001) which were prepared as polished grain mounts. Five fragments were of the weathered material and the remainder of the normal meteorite material. Photomicrographs were prepared for each fragment and each was assigned an number for identification purposes. No detailed petrographic studies were done.

The studies were done at the laboratories of the Geological Survey of Canada. The electron column was a Camebax MBX microprobe with a cathodoluminescence detector supplied by Electron Optic Services, and a Lamonte back scattered electron detector. Back scattered electron images and cathodoluminescence images were studied for each fragment. A few mineral analyses were performed with an SX50 microprobe which has an Advanced MicroBeam operating system.

Cathodoluminescence was observed for the glass, maskelynite, and clinopyroxene. With the exception of fragment 3738, the maskelynite displayed a uniform cathodoluminescence image. The maskelynite of this fragment had a distinctive cross-hatched pattern as shown in Figure 1. Optically the maskelynite was isotropic and had the same appearance as the other glasses. Although, only a few analyses were obtained of the maskelynite, the analyses indicate that the maskelynite is very homogeneous and that it does not have a feldspar stoichiometry. The composition was Ab63An30Or7 with total wt.% end members of 85%.

The CL (cathodoluminescence) pattern is not likely an artefact of sample preparation because it was not observed in the maskelynite in the same polished grain mount and the image was reproduced on an other instrument. It is not likely related to chemistry in that this pattern is not typical of chemical zonation patterns. The texture may be related to a micro structure in the glass such as strain, shock or devitrification.

Early in 1998 other maskelynites will be examined from the collections of the Geological Survey of Canada and it is planned to add a spectrometry to the CL system in 1998 so that the spectral signature of this texture can be determined.

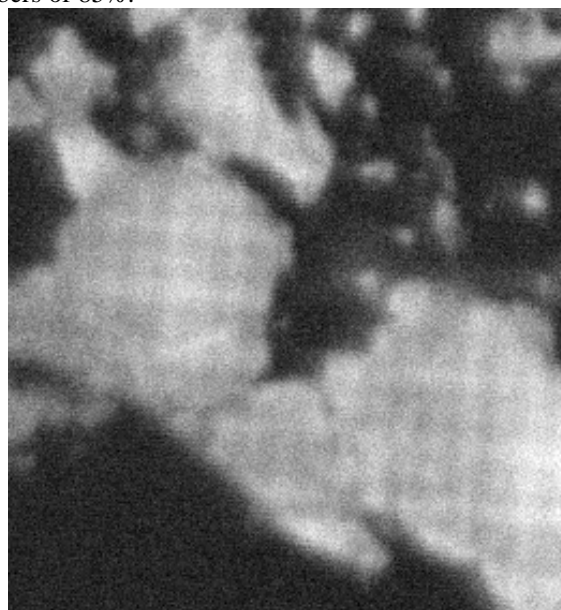


Figure 1.